DS - 300 - T3

INTEGRATING DIGITAL MICROVOLTMETER

WITH TRANSDUCER CONDITIONING FOR PHYSICAL AND SCIENTIFIC MEASUREMENT

OWNER'S MANUAL

DORIC SCIENTIFIC CORPORATION

327944

TEMPORARY MANUAL

DS-300-T3

DIGITAL TEMPERATURE INDICATOR

NOTE: The DS-300-T3 Manual is currently in production. The purpose of this interim document is to supply only the necessary information needed to properly operate and calibrate the instrument.

NOTE: REGULAR MANUALS WILL BE AUTOMATICALLY FORWARDED TO ALL THOSE WHO HAVE RECEIVED TEMPORARY MANUALS.

1.1 General Description:

The Doric Scientific DS-300-T3 is a fully automatic, solid state measuring instrument which, after proper signal conditioning, displays the outputs of a wide variety of thermocouples directly in ^{o}F or ^{o}C.

The instrument includes a microvolt level A/D converter; direct nixie display and internal reference junction compensation. Automatic thermocouple break detection is also standard.

The DS-300-T3 is normally wired to pperate from a 115 VAC ±10%, 50-400 Hz power source but may also be wired for 230 volt operation by removing the white power cord wire from the white transformer wire and connecting it to the previously unused red transformer wire.

A .175 Amp Slo-Blo power fuse is used for 115 volt operation; a .100 Amp Slo-Blo for 230 volts.

Four high intensity Burroughs nixie tubes form the in-line readout, providing a sharp display of the digits and decimal point. Storage circuits hold the display constant between and during encoding, eliminating blanking, blurring, and last-digit flutter. In the event the instrument is being overloaded by an excessive voltage input, the nixie display will begin noticeably flashing off and on. When the input has been corrected, normal display will continue. If the thermocouple input has opened, the nixies will blur and flash, making it impossible to read the display. Once the open circuit has been remedied, normal readout will return.

A "-" symbol on the readout indicates the instrument is reading in the negative (minus) polarity. Absence of this symbol indicates a positive polarity.

The overflow 1 is a neon lamp.

1.2 External Controls

1.2.1 Power Switch

Power is applied to the DS-300-T3 by moving the toggle switch located on the front panel from OFF to the ON position.

1.2.2 Multipoint Pushbuttons (Option ISC-12)

If the DS-300-T3 is equipped with this option, the lower front panel will have 12 in-line pushbutton switches installed. Each button controls the selection of a particular thermocouple.

1.2.2 continued...

Depression of a button selects that given thermocouple's temperature for display on the readout of the DS-300-T3. (To disengage a pushbutton, push all the way in and release as the switches are of the "Push-Push" variety.)

When two or more of the pushbuttons are engaged, the instrument will display the "average" temperature of all those thermocouples being measured.

1.3 BCD Outputs (Option S6P)

When isolated BCD outputs are installed, they are brought out to the rear of the instrument via a 36 pin Amphenol connector, J1. These outputs enable the DS-300-T3 to interface with a printer. Remote sample command and readout "hold display" inputs are included.

The BCD outputs are positive true unless otherwise specified at time of purchase.

1.4 Trend/Rate of Change Indicator (Option S8)

To aid the operator watching critical temperature points, this option provides directional arrows located in the readout which flash to indicate which direction the temperature is going. Additionally, the rate of change of the temperature is indicated via the relative frequency of the flash rate of the trend arrows. This relative flash rate is pre-established with a fixed resistor and may be changed in the field if desired.

1.5 Digital Set-Point (Option S9)

When this option is installed, the front panel includes a pot and a pushbutton which are used in conjunction whth each other to set limits on the temperature range which, when exceeded, will cause an alarm symbol to flash on the readout.

The set-point is arrived at by depressing the upper front panel pushbutton. This disconnects the input to the instrument and connects the readout to an internal reference. The pot, which is a ten turn pot covering a span of $\approx 200^{o}$ is then manually adjusted until the display in the readout is set at the desired limit. When this limit is exceeded, a relay closure triggers the alarm.

1.6 Analog Outputs (Option S7)

When requested, analog outputs are brought out to the rear of the instrument. These outputs are normally intended to drive a floating analog indicator.

1. Features/Specifications

The Model DS-300-T3 is a digital temperature indicator which monitors I-C, C-A, C-C or other thermocouple temperatures over the commonly used portion of their respective ranges with 1° resolution; 1° repeatability and high accuracy.

Electronic digital techniques provide direct decimal display with no parallax or interpretation errors, faster speed with tracking display, superior solid state reliability, no moving parts to wear, computer compatible outputs, elimination of noise susceptibility, jitter, dither, deadband, and backlash.

Sophisticated total guarding techniques allow direct use with grounded thermocouples, even with printer outputs grounded. High noise rejection of 160 db (100 million to one reduction of unwanted noise; reduced 100 volts P-P to 1 microvolt, approximately equivalent to 1°F) allows rock solid stable display in virtually any customer application, regardless of environment.

AUTO-ZERO, A Doric proprietary digitizing technique which eliminates preamplifiers and zero drift, and Doric's proprietary digital linearization technique all blend to provide a highly stable display, regardless of ambient temperature variation, frequency of re-calibration, and wide power line variations. The linearizer never requires calibration. Only two pots are ever used for total instrument calibration: a two minute job done once a year if you like.

Extensive use of MSI and LSI integrated circuits along with simplified second generation design allows total instrument construction on a single, heavy-duty glass epoxy PC board.

Low 8 watt power dissipation yields exceptional reliability, cool operation, and lends itself to DC or batter pack operation with minimum effort.

PERFORMANCE SPECIFICATIONS

INPUT CIRCUIT:
Guarded differential; allowing grounded or floating sensors.

MEASUREMENT METHOD:
Auto-Zero, dual slope integration with potentiometric input.

OVERLOAD:
±120V DC continuous; 115V AC line across input will not damage.

INPUT IMPEDANCE:
200 Megohms.

LINEARIZATION:
100% digital with no analog approximation circuits, non-linear slidewires or other electromechanical/optical methods.

ACCURACY:
(See Range Table at end of specifications.)

COMMON MODE REJECTION:
160 db @ 59 Hz increasing 12 db/octave. 250V DC or peak AC. 100Ω Runbal

NORMAL OR SERIES MODE REJECTION:
46 db @ 59 Hz increasing 18 db/octave. Typically 80 db at power line frequency.

POWER:
105-125VAC, 50-400 Hz, 8 Watts.

CALIBRATION DRIFT:
Maximum ±1°F change in one year for base metals.

CIRCUITRY:
All silicon, solid state; extensive use of MSI and LSI integrated circuits.

BCD OUTPUT OPTION:
Digital outputs may be grounded even when thermometer is used with grounded thermocouples with no loss of isolation or noise rejection characteristics; parallel 8-4-2-1 code, buffered, positive true logic; negative true available. Remote sample command input and print command output lines. Includes mating connector. "0" ≥ .5V, "1" ≥ 3V

REMOTE HOLD:
Providing a closure between two pins on the rear causes the instrument to stop sampling and retain the reading in proccess indefinitely.

RESOLUTION:
1°F or 1°C

TEMPERATURE STABILITY:
±.0025% Rdg/°F ±0.5 uv/°F

COLD JUNCTION COMPENSATION:
±.025°F from 50°F to 104°F.

DISPLAY:
Burroughs Nixies

SAMPLE RATE:
3-4/sec. fixed (settable by resistor); integration time is 100 ms.

ZERO DRIFT:
None.

CALIBRATION:
2 point - zero and full scale; no need for individual segment calibration at any time. Extender card never required.

TREND/RATE OF CHANGE INDICATOR?ALARM OPTION:
To aid the operator watching critical temperature points, directional arrows flash in the readout to indicate which direction, up or down, the temperature trend is going; additionally, the rate of change of temperature is displayed via the relative frequency of the flash rate of the threnD arrows. This relative flash rate is pre-established with a fixed resistor, changeable in the field.

ANALOG OUTPUT OPTION:

Buffered, linear output representation of compensated mv input signal. Nominal gain of X100; normally intended to drive a floating analog indicator or recorder.

DIGITAL SET-POINT OPTION:

For alarm or limit set applications; a front panel, 20 turn pot allows setting the alarm temperature precisely by using the actual Nixie display in conjunction with a pushbutton. To allow ease of settability with the pot to the exact degree desired, the pot normally covers a span of $\approx 200^{\circ}$.

Moving the alarm range simply involves a metal film resistor substitution on easily changeable terminals. Alarm output is a SPST relay closure.

NON-STANDARD RANGES:

Refer to library of standard ranges available with Doric DS-100-T3 thermometer. Many standard ranges are available in all TC types, $^{\circ}F$, $^{\circ}C$, $^{\circ}K$ and with 0.1° resolution and extremely high accuracies. Consult factory for availability of range of your interest.

STANDARD RANGES

Ordering No.	Type	Materials	Range	Overall Calibration Accuracy @ 77 $\pm 5^{\circ}F$	No. of Segments
K301	K	Chromel-Alumel	0 to $+2400^{\circ}F$	$\pm 1.5^{\circ}F$	12
J301	J	Iron-Constantan	0 to $\pm 1595^{\circ}F$	$\pm 1^{\circ}F$	16
T301	T	Copper-Constantan	-310° to $+750^{\circ}F$	$\pm 1.5^{\circ}F > -100^{\circ}F$ $\pm 2^{\circ}F < -100^{\circ}F$	16
T302	T	Copper-Constantan	-60 to $+400^{\circ}C$	$\pm 1^{\circ}C > 0^{\circ}C$ $\pm 1.5^{\circ}C < 0^{\circ}C$	9
E301	E	Chromel-Constantan	0 to $+1600^{\circ}F$	$\pm 2.5^{\circ}F > 300^{\circ}$ $\pm 1.5^{\circ}F > 300^{\circ}$	8
R301	R	Platinum-Plat. 13% Rhodium	800 to $1600^{\circ}C$	$\pm 1^{\circ}C$	8
S301	S	Platinum-Pla. 10% Rhodium	800 to $1600^{\circ}C$	$\pm 1^{\circ}C$	8

2.3.1 Grounding Considerations

For noise-free operation, the measuring circuit should be connected to earth ground at only <u>one</u> point:

a. If the thermocouple is grounded, the circuit shown in Figure 2-2 should be employed.

b. If the thermocouple is completely floating, the circuit shown in Figure 2-3 will be most advantageous.

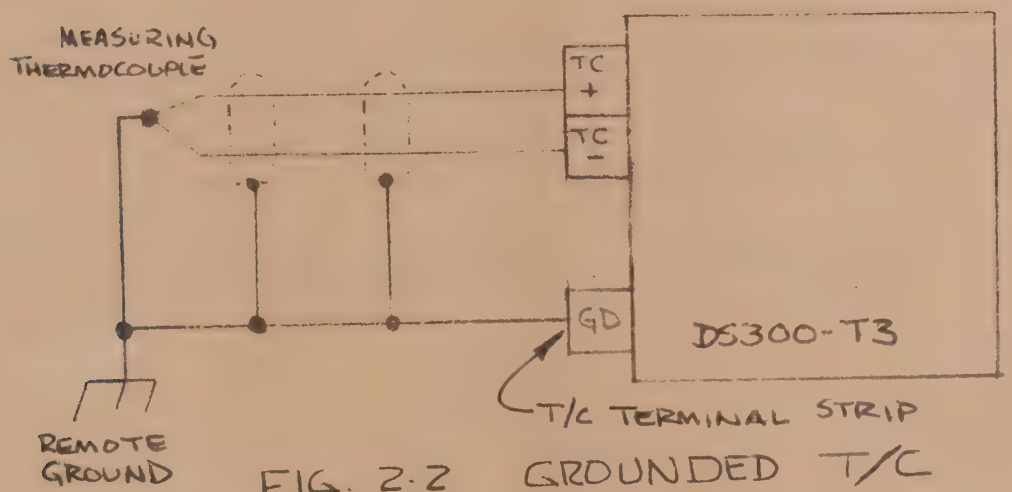


FIG. 2-2 GROUNDED T/C

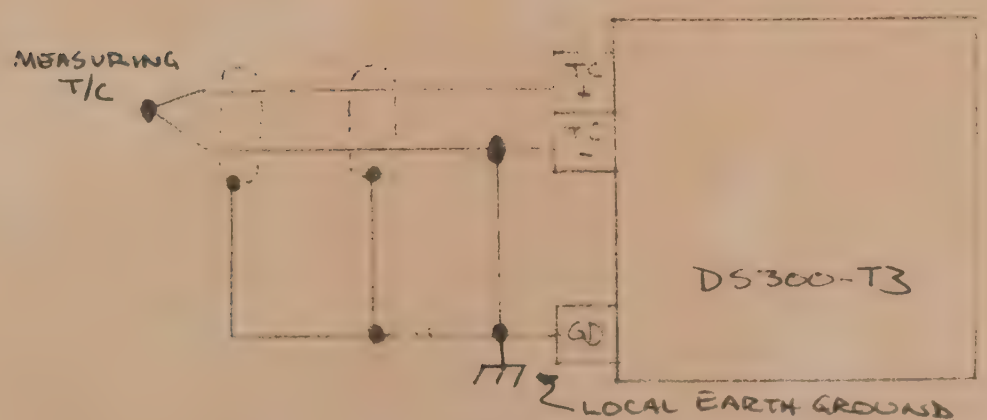


FIG 2.3. FLOATING T/C

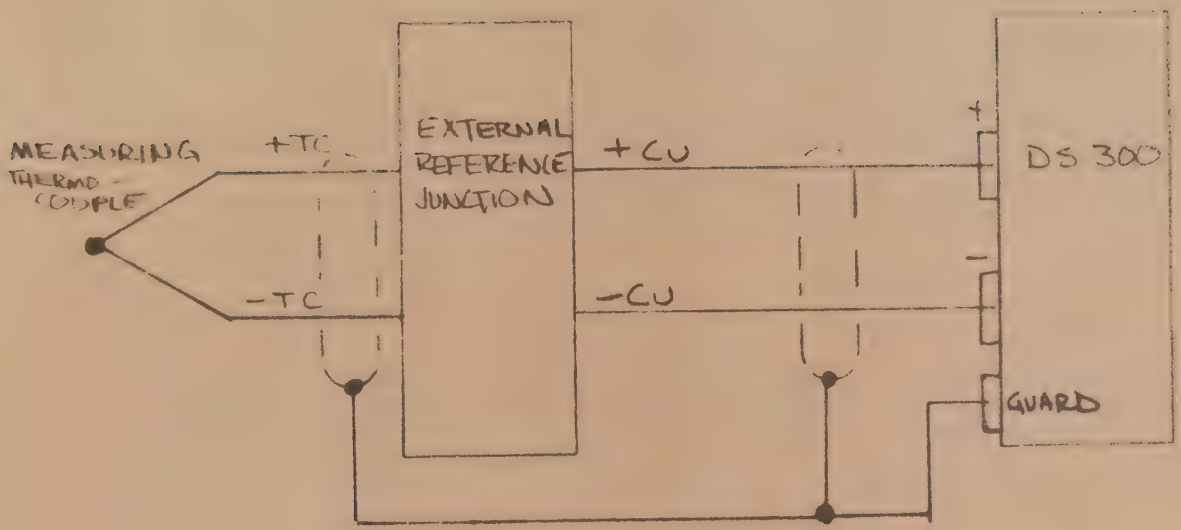


FIG 2.4 HOOKUP FOR EXTERNAL REF. JNC.

2.3.2 Wiring: Multipoint T/C selector (Option ISC-12)

The ISC-12 multipoint thermocouple selector is a switching unit having the capability of accepting the outputs of up to 12 thermocouples; selecting one or more of them and feeding the signals into the DS-300-T3.

The front panel consists of a series of pushbutton switches which select the desired thermocouple. The switch numbers read from right to left, S1 being the switch on the extreme right hand side as viewed from the front. The switch corresponds with the S1 terminals that the thermocouple will be attached to. Blank adhesive labels are provided for user identification.

To wire the multipoint selector, accomplish the following procedure:

A. Remove the six screws securing the rear panel and slide the ISC-12 board assembly completely out of the chassis. Note that the board is being removed from the fourth slot up from the bottom and that the switches are at the bottom of the board.

B. Remove the screws holding the shield to the circuit board. Set the shield aside.

C. Using Fig. 2.5 as a guide, route the thermocouple wires to the appropriate terminals.

D. Run three wires (the same type wire as the thermocouples) from the HI, LO and GUARD terminals (located in the center of the ISC-12 board) out to the rear of the board. BE SURE THAT THE 3 WIRES ARE PROPERLY IDENTIFIED SO THAT PROPER CONNECTION TO THE DS-300-T3 CAN BE MADE LATER.

E. Place the shield over the thermocouple wires and secure.

F. Slide the board back into the DS-300-T3. Secure the rear panel, making sure that the thermocouple wires, as well as the wires labeled HI, LO, and GUARD are routed through the opening provided in the lower right hand corner of the rear panel.

G. Route the HI, LO and GUARD wires to the DS-300-T3 terminal strip and attach to the corresponding terminals.

SECTION III CALIBRATION

3.1 Test Equipment Needed

A low source impedance (2K or less) DC voltage calibrator capable of supplying accurate voltages up to 100 millivolts with better than one microvolt resolution and stability is required. Also, a stable ice bath accurate to 0.5° will be needed.

3.2 Calibration Procedure (INTERNAL REF SYS.)

NOTE: Allow the DS-300-T3 a 30 minute warm-up prior to calibration.

Hook-up the DC calibrator and ice bath to the DS-300-T3 as shown in Fig. 3-1. Prepare test wires per Fig. 3-3. Refer to Fig. 3-4 and follow the calibration instructions noted.

To gain access to the calibration pots shown in Fig. 3-2, remove the two screws from the center of the rear panel. This will make the upper portion of the DS-300-T3 mobile. Power and test wires may be left attached and the upper portion of the instrument can be moved forward out of the housing until the three pots are accessible.

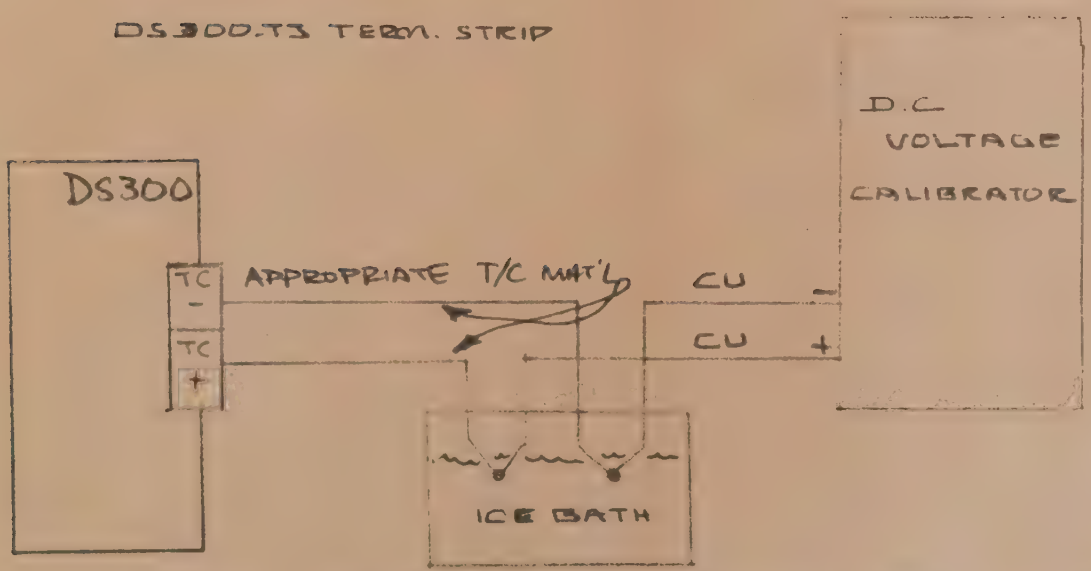


FIG 3-1 CALIBRATION SET-UP (INTERNAL REF SYS.)

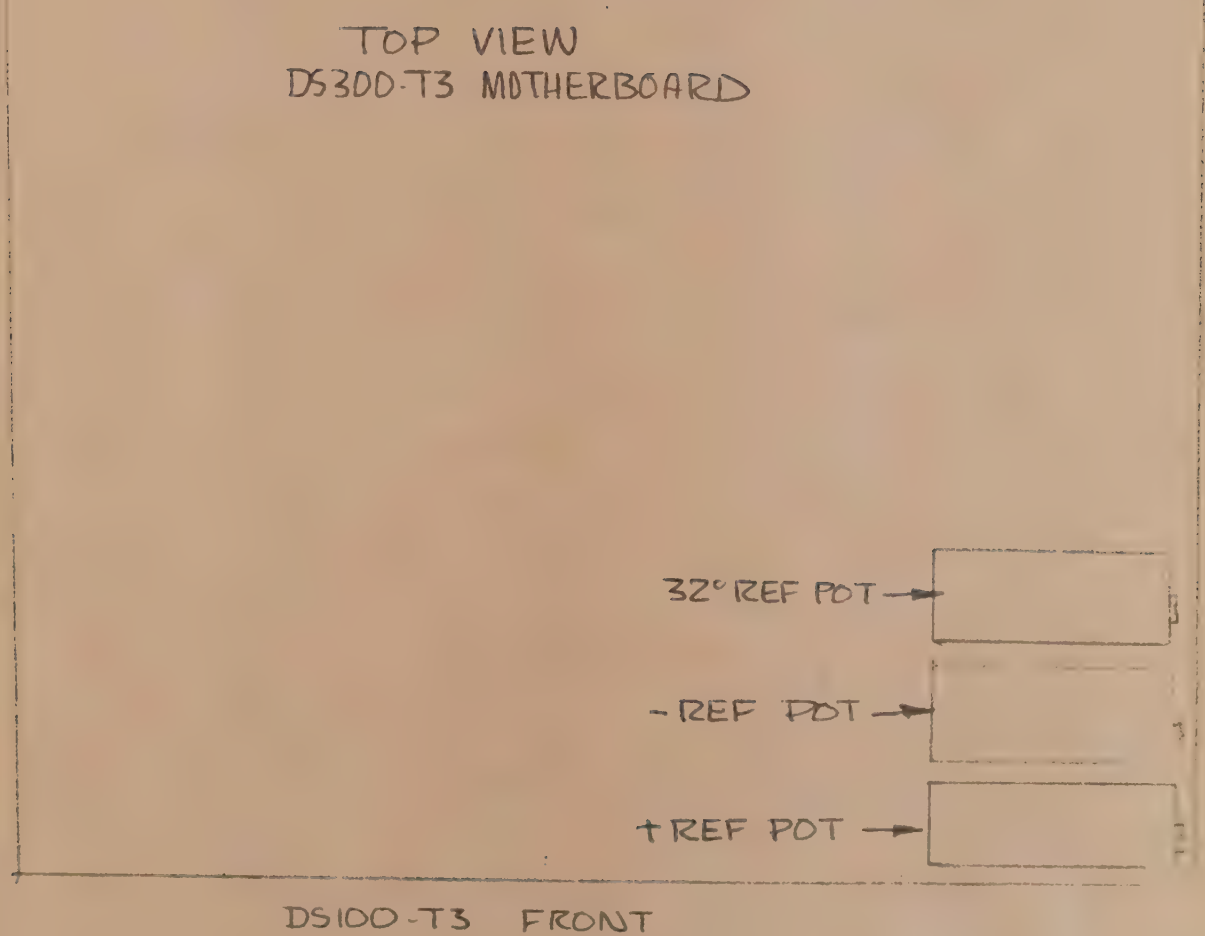


FIG 32 CALIB. CONTROLS

Fig. 3.3: CALIBRATION CHART FOR THERMOCOUPLE INPUTS

*T.C. Type	Materials	Range	Input	Adjust	Read	Input	Adjust	Read	Input	Adjust	Read
K	Chromel-Alumel	0 to 2400°F	0.000 mv	32° Offset Pot	+32°F	+53.0100 mv	+Ref Pot	2400°F			
J	Iron-Constantan	0 to 1595°F	0.000 mv	32° Offset Pot	+32°F	+50.7600 mv	+Ref Pot	1595°F			
T	Copper-Constantan	-310 to +750°F	0.000 mv	32° Offset Pot	+32°F	+21.4750 mv	+Ref Pot	750°F	-4.7090 mv	-Ref. Pot	-310°F
T	Copper-Constantan	-60 to +400°C	0.000 mv	32° Offset Pot	0°C	+20.8740 mv	+Ref Pot	400°C	-2.1350 mv	-Ref. Pot	-60°C
E	Chromel-Constantan	0 to 1600°F	0.000 mv	32° Offset Pot	+32°F	+67.6500 mv	+Ref Pot	1600°F			
R	Plat-Plat. Rhodium 13%	800 to 1600°C	0.000 mv	32° Offset Pot	0°C	+18.7270 mv	+Ref Pot	1600°C			
S	Plat-Plat. Rhodium 10%	800 to 1600°C	0.000 mv	32° Offset Pot	0°C	+16.7160 mv	+Ref Pot	1600°C			

*Standard ranges. For other ranges, refer to NBS V to T Charts.

EXAMPLE: For type K, apply compensated calibrator (Fig. 3-1) to + and - T.C. inputs on the DS-300-T3. Apply 0.000 mv and adjust the 32° ref. pot for a readout of +32°F. Apply 53.0100 mv to the DS-300-T3 T.C. input. Adjust the +Ref pot for a readout of 2400°F.

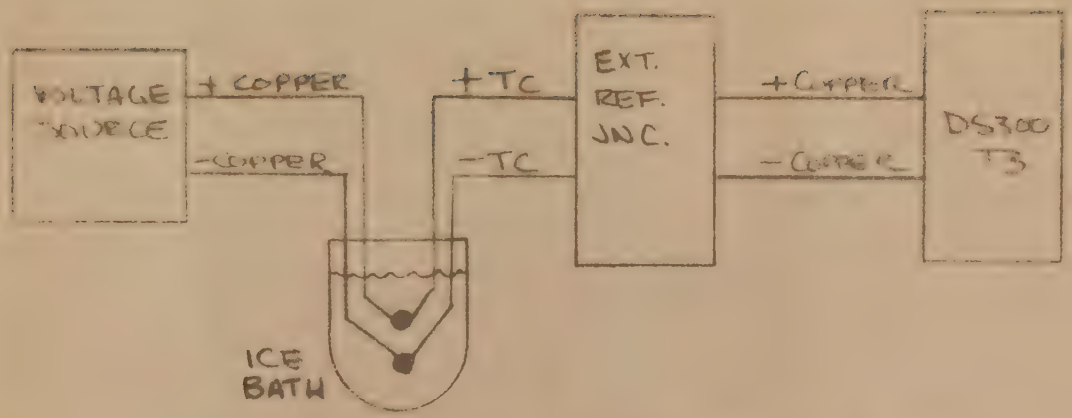
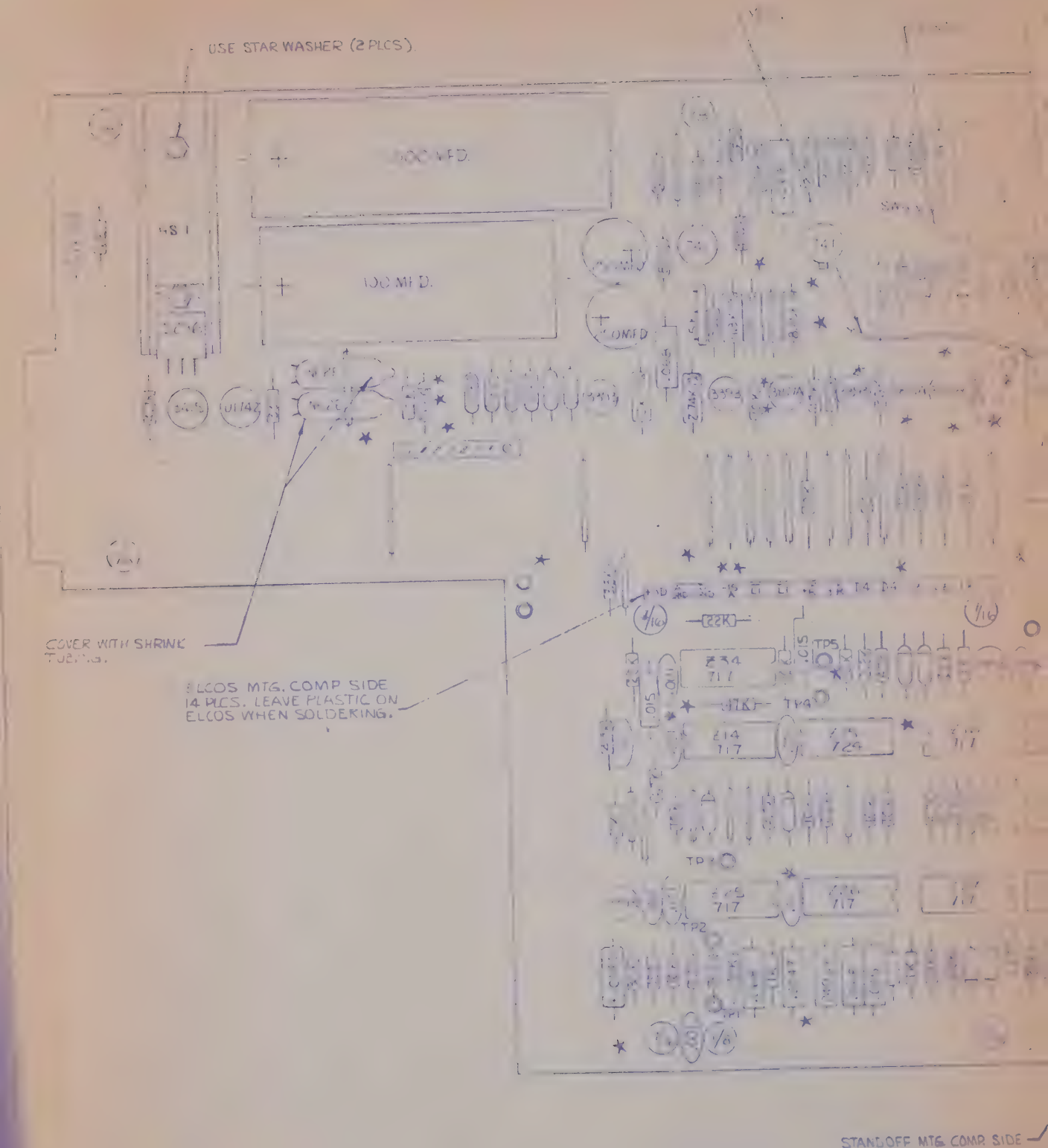


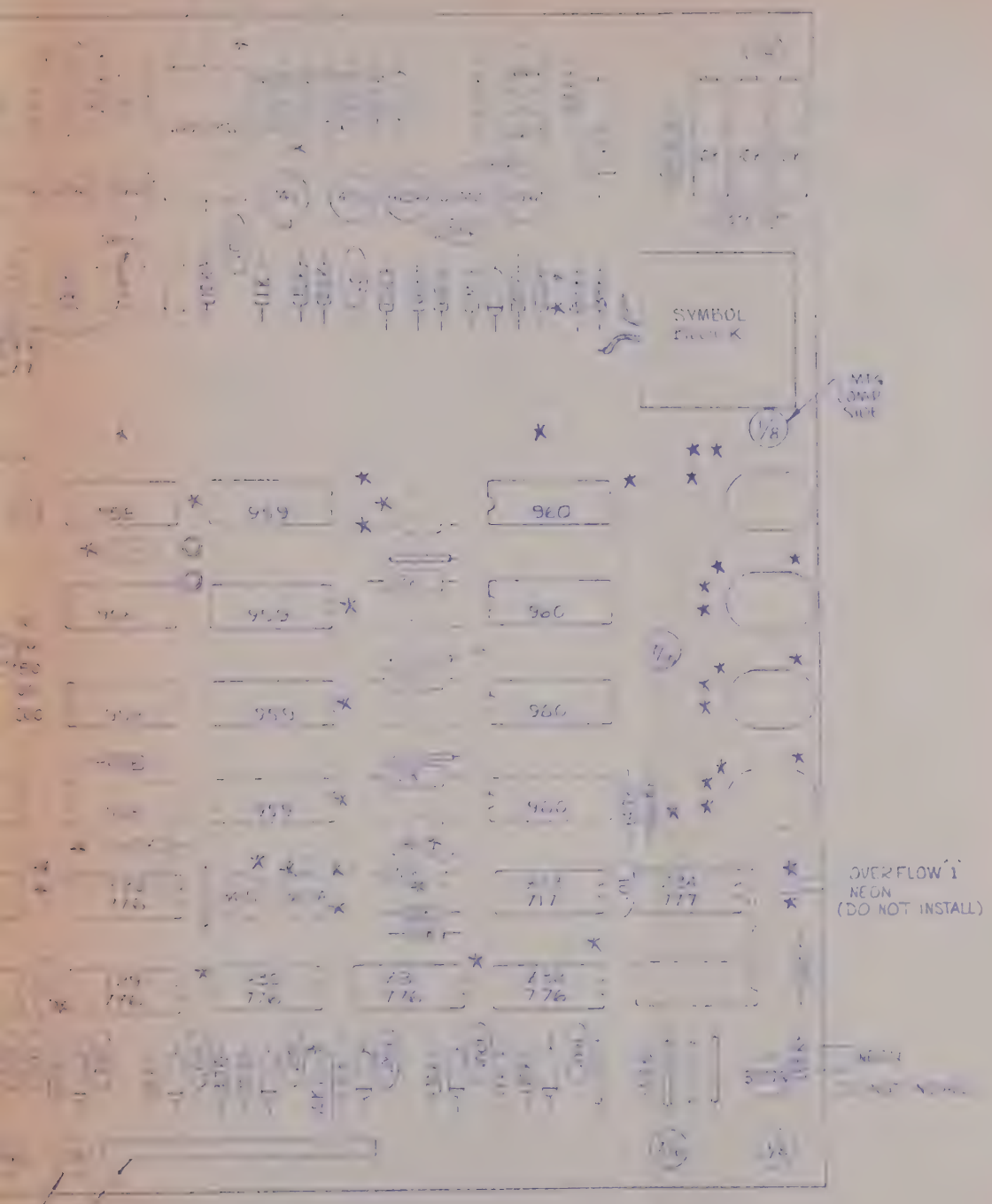
FIG. 3.4 CALIBRATION SET-UP FOR INSTRUMENTS HAVING EXTERNAL REF. JNC.

TYPE	INPUT	ADJUST	READ	INPUT	ADJUST	READ	INPUT	ADJUST	READ
K	0.0000 MV	OFFSET POT	32°F OR 150°F	53.0100 mv (32°) 50.3500 mv (150°)	+REF POT	2400°F			
J	"	"	"	50.7600 mv (32°) 47.3500 (150°)	"	1595°F			
T	"	"	"	21.4750 mv (32°) 18.7240 mv (150°)	"	750°F	-4.7090 mv (32°) -7.4200 (150°)	-REF POT	-310°F
E	"	"	"	67.6500 mv (32°) 63.6100 (150°)	"	1600°F			

FIG 3.5 CALIBRATION CHART FOR INSTRUMENTS HAVING EXTERNAL 32° OR 150° REF JNC.


USE STAR WASHER (2 PLCS).
100 MFD.
100 MFD.
COVER WITH SHRINK TUBING.
8 ELCOS MTG. COMP SIDE 14 PLCS. LEAVE PLASTIC ON ELCOS WHEN SOLDERING.
STANDOFF MTG. COMP SIDE

6. (●) INDICATES PIN 1 OF INTEGRATED CKT.
5. DASH LINES DO NOT INSTALL COMP.
4. ○—○ INDICATES JUMPER.
3. ALL DIODES ARE 1N914.
2. (✱) INDICATES FEED THRU.
1. ALL RESISTORS VALUES ARE IN OHMS. ± 5%, 1/4W CARBON.



COS MTG. COMP SIDE. (9 PLACES.)

ASSEMBLY

VALUES FOR R1	
VALUE KΩ	TRIMMING RANGE KΩ
34.8	17 - 19.5
39.2	18.5 - 20.4
47.5	19.5 - 22.6
51.1	21 - 23.4
75	23 - 27.4
140	27 - 32.8
178	27.8 - 40

THERMOCOUPLE WIRE INPUT
REF. JUNCT.
R1 S.O.T
R2 33.2K 1% M.F.
R3 10K OFFSET ADJUST.
R4 5.717K 5% W.W.
R5 .05% W.W. J 137.5Ω K 107.8Ω T 109.1Ω
R8 °C: 133K 1% M.F. °F: 125.7K 1% M.F.
-15V
CR1 IN457
R6 100K
R7 33K 1W.
C37 .01
D3
R109 470K
CR2 IN457 (4) CR3 CR4 CR5
C1 .33
C2 .18
R9 68K
R10 47K
R11 150K
D1
Q1 U1742
Q2 U1742
R12 39K
D2
Q3 SU2211
R14 10K R15 5K R16 10K
R13 12K
C3 220PF D.M.
R17 1K C4 .001
Z37 741
INTEGRATOR
C5 .01
R18 1K
-15V
ZERO CROSSING DETECTOR
CR6
Q4 2N4250
Q5 2N4250
R23 68Ω
R19 3.3K
R22 15K
R24 15K
R25 2.2K
R26 220K
R27 68K
C8 .01
C6 .033 P.S
R20 S.O.T 1%
R21 S.O.T 1%
C7 .068
-15V
+15V
AUTO ZERO CIRCUIT.
Q6 U1742
R28 1 MEG
R29 680K
CR7
C9 100PF
D3
11 Z 12 D GND. 6 D4 5 W
A
17 16 15 14 13 11 10 9 8 7
MATRIX ASSY 300
SCHEMATI 300-60
RESET
10 KHZ
Z29 Z29 Z30 Z30 Z31 Z31 Z32 Z32
80 KHz CLOCK
C12 .015
L1 240uh
C45 .068
C46 S.O.T
CR31
R53 1K
R54 100K
R55 10K
D GND.
A
+4D
R50 1K
R51 5K
R52 4.7K
C11 .01
B.R.M AMPLIFIER & DIVIDER.
D GND
R56 22K
R57 22K
R58 22K
R59 10K
R60 10K
R61 10K
R62 10K
R63 10K
C13 220
C14 220
C15 220
C16 220
C17 .001
C18 .001
C19 .001
C20 .001
C21 .001
CR8 CR9 CR10 CR11 CR12 CR13 CR14 CR15 CR16
Z33
R64 4.7K
F
E
D GND.
D LZ
T
+4D
D GND
LO
L1
LR
Z25
R138 3.3K
Q20 2N3393
R139 4.7K
LO
CLOCK GATE & AMPLIFIER.
CLOCK RESET
R71 2.2K
C27 .001
R70 10K
R69 1K
C24 .0047
C25 .068
C26 .01
D GND.
RESET
STORE GEN.
R72 2.2K
LZ & DUAL DIFF.
R101 4.7K
CR19 CR20
R102 10K
R103 10K
C44 .001
C34 .001
R104 4.7K
R105 10K
D4
LZ
LR+R
R106 4.7K
C35 .001
R107 10K
TP4
TP3
LR
800 BIT
R131 2.2K
C36 .001
R108 10K
R110 2.2K
TP5
LI
R73 4.7K
R75 10K
R77 22K
C28 .015
C29 .015
R74 22K
R76 22K
CR17
CR18
Z16
Q15 2N3393
R78 1K
TP6
RESET GEN.
D GND.
Z5 958
Z8 958
Z11 958
Z18 958
Z6 959
Z9 959
Z12 959
Z19 959
Z4-9 Z4-8 Z4-12 Z4-13
Z1-12 Z1-10 Z4-14 Z4-10
Z2-10 Z3-9 Z2-8 Z2-9
Z1-14 Z1-15 Z3-8 Z2-14
Z7 960
Z10 960
Z13 960
Z20 960
0 1 2 3 4 5 6 7 8 9
V1 R79 220K R80 22K, 1/2W
V2 R81 220K R82 22K, 1/2W
V3 R83 220K R84 22K, 1/2W
V4 R85 220K R86 22K, 1/2W
+190V
D GND.

REFERENCE DESIGNATORS		
REF. DES.	LAST USED	DELETED (NOT TO BE REUSED)
R (RES.)	142	
C (CAP.)	46	
CR (DIODE)	31	
Q (TRANS)	23	
Z (I.C.)	37	

REFERENCE CIRCUIT

+TEMP ADJUST R35 10K

+ER

U1742

R31 470K

R32 1MEG. 1%

Q8 2061

R34 150K

R36 133K 1%

R134 100K

-15V

D5

R33 1MEG. 1%

Q9 P108TE

-TEMP ADJUST

R37 133K 1%

R38 10K

-ER

D6

-15V

D6 D1 D3 D5 D2

R41 4.7K

R42 150K +15V

R46 150K +15V

2N3877A Q10

2N3393 Q11

2N3877A Q12

2N3877A Q13

2N3393 Q14

R39 10K R40 10K R43 10K R44 10K R45 10K R47 10K R48 10K R49 3.9K

-15V

Y L1 S L1 U LR V LZ X LR+R B

+8D ANALOG GND. +4D C B K H M L Y X

1 6 5 4 3 2 200 100 80 20 10

C23 .001 DGND.

N LZ O LZ

R67 4.7K R68 4.7K

+4D

R65 4.7K R66 10K

RESET C22 .01

S

Z24 777

Z23 Z23 Z23 Z23 Z16 Z16 Z16 Z27

G D GND.

SEGMENT COUNTER

+120V

R132 33K R133 33K

SYMBOL BLOCK

7 23

+190 +120

CR22 SCE6

R122 10K

DS3 DS4 NE-2E (2)

R121 4.7K 1/2W

C39 100

VIOL. GRY. WHT. GRN. BLU. BLK (SHIELD)

CR23 CR24 CR25 CR26 SCE-2

C40 5000

CR27 CR28 C41 250 C42 250

T1

S1 F1 .175A BRN. RED ORN. YEL.

OVERLOAD DET.

Z17 Z17 Z17 Z17

L1 LZ LR LZ RESET LOL LOL

+120 R98 4.7K R99 4.7K

R90 33K R91 33K Z21 7.76

DS1 DS2 SIGNAL LITE (2)

Q16 Q17 Q19 R100 1K 2N3415

R92 10K Z1-8

2N3877A (2)

D GND.

R111 S.O.T 1%

R112 1K 1%

R113 S.O.T 1%

R116 11.3K,1%

R119 390Ω

R120 27.4K,1%

Z36 741

+15V

R114 330Ω

R117 5K

R115 S.O.T 1%

R118 8.25K 1%

CR21 IN821

C38 .068

R123 24.9K 1%

R125 20K,1%

C43 .068

Z35 741

-15V

R126 1K

R127 133K 1%

+8D.

+4D

Q23 2N3638

Q22 2N3638

R130 348MF S.O.T 2.87

R128 604 MF.

R124 33K

CR30

R129 1.5K

Q21 2N3393

CR29 IN702

68Ω R...S 36

35

D GND.

Z9-13 Z1 9

Z9-10 Z1 10

Z19-10 Z1 8

Z19-13 Z1 11

Z22-9 Z1 30

Z21-9 Z1 31

Z12-7 Z2 12

Z12-4 Z2 13

Z12-13 Z2 14

Z9-4 Z4 29

Z9-7 Z4 26

Z6-4 Z4 27

Z6-7 Z4 28

Z6-13 Z4 16

Z6-10 Z4 15

Z12-10 Z3 34

Z19-7 Z3 33

Z19-4 Z2 32

OPTION USED WITH I.O. CARD ONLY.

J1

1	
2	
3	
4	
5	DEC.
6	SAMPLE COMP
7	SYM.
8	2^3
9	1^1
10	2^1
11	1^3
12	4^2
13	8^2
14	1^2
15	2^0
16	1^0
17	
18	COMP SIDE / CKT. SIDE.
19	
20	
21	
22	
23	SYM.
24	HOLD
25	SAMPLE COMM.
26	4^1
27	8^0
28	4^0
29	8^1
30	OF "1"
31	- POL.
32	8^3
33	4^3
34	2^2
35	DIG. GND.
36	+4 V.

&ALL GATES MC 717.

7 SCM 431P 0-2400 °F "K"
SCM 432P 0-1600 °F "E"/0-+400 °C "T"
SCM 362 0-1595 °F "J"
SCM 363 800-1600 °C R1800-+1600 °C "S"
SCM 364 -310°-+750 °F "T"

6. → OR ⊢ INDICATES INTERNAL CONNECTION.
5. ◁ INDICATES J1 CONNECTION.
4. ○ INDICATES ELCOS TO I.O. BD. 300-025 & MATRIX BD. 300-002
3. CAP. VALUES ARE μf.
2. RESISTORS ARE ±5%, ¼ W.
1. ALL DIODES ARE IN914.

NOTES: (UNLESS OTHERWISE SPECIFIED.)

REV	DESCRIPTION	DATE	DRAFT	APPR.
01	UPDATED PER PRINT	6-2-70		

DORIC SCIENTIFIC CORPORATION

SCHEMATIC DIAGRAM DIGITAL BD. DS-300

DRAFT: J. Carter 6-2-70

SHT. 1 OF 1

DWG. NO. 300-601 REV. 01